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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KAREN S. LYONS and NORMA P. UGARTE

Appeal 2009-014763
Application 10/693,845
Technology Center 1700

Before BRADLEY R. GARRIS, CHARLES F. WARREN, and
TERRY J. OWENS, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL¹
STATEMENT OF THE CASE

¹ The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the “MAIL DATE” (paper delivery mode) or the “NOTIFICATION DATE” (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

The Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1-18, which are all of the pending claims. We have jurisdiction under 35 U.S.C. § 6(b).

The Invention

The Appellants claim a platinum group metal-tin oxide hydrate, a material and device which include it, and a method for using it for electrochemical reduction. Claim 1 is illustrative.

1. A chemical composition comprising the formula:
$$\text{M-SnO}_x \cdot y\text{H}_2\text{O}$$
wherein M is a platinum group metal; and
wherein x and y are positive numbers.

The References

Watanabe (Watanabe '487) 5,922,487 Jul. 13, 1999

Akiko Katayama, "Electrooxidation of Methanol on a Platinum-Tin Oxide Catalyst", 84 *J. Phys. Chem.* 376-81 (1980).

M. Watanabe et al., "Preparation of Dispersed Platinum on Conductive Tin Oxide and Its Catalytic Activity for Oxygen Reduction", 130 *J. Electrochem. Soc.* 59-64 (Jan. 1983) (hereafter the Watanabe article).

Steven D. Gardner et al., "Characterization Study of Silica-Supported Platinized Tin Oxide Catalysts Used for Low-Temperature CO Oxidation: Effect of Pretreatment Temperature", *J. Phys. Chem.* 835-38 (1991) (hereafter Gardner).

The Rejections

The claims stand rejected as follows: claims 1, 2, 4, 10-12, 17 and 18 under 35 U.S.C. § 102(b) over the Watanabe article; claim 3 under 35 U.S.C. § 103 over the Watanabe article in view of Katayama; claims 1, 2, 4, 5, 12, 13, 15 and 17 under 35 U.S.C. § 102(b) over Gardner; claim 3

under 35 U.S.C. § 103 over Gardner in view of Katayama; and claims 1, 2 and 4-16 under 35 U.S.C. § 103 over Watanabe '487 in view of the Watanabe article.

OPINION

We reverse the rejections.

Issue

Have the Appellants indicted reversible error in the Examiner's determination that Watanabe or Gardner discloses a platinum group metal-SnO_x hydrate?

Rejections involving the Watanabe article

Findings of Fact

The Watanabe article discloses a catalyst comprising platinum on tin oxide (abstract). The Watanabe article states that "[i]t has been shown (20) that an alkaline pretreatment of SnO₂ causes the pH response of the electrode to be enhanced, evidently through a superficial hydration, *i.e.*, the formation of an -Sn-OH surface by hydrolysis of -Sn=O bonds" (p. 60, fourth full paragraph).

Analysis

The Examiner points out that the Watanabe article teaches that alkaline pretreatment of tin oxide causes hydration, and that Hawley's Condensed Chemical Dictionary (hereafter Hawley's) defines "hydration" as "[t]he reaction of molecules of water with a substance in which the H-OH bond is not split"² and states that "[t]he products of hydration are called

² *Hawley's Condensed Chemical Dictionary* 611 (11th ed. 1987).

hydrates, i.e., $\text{CuSO}_4 + 5\text{HOH} \rightarrow \text{CuSO}_4 \cdot 5\text{HOH}$ ".³ The Examiner argues that "one of skill would have concluded the tin oxide subjected to hydration in Watanabe could have been written as $\text{SnO}_{x-y} \cdot \text{H}_2\text{O}$ because by definition the hydration of tin oxide results in a hydrate compound" (Ans. 8).

The Appellants argue (Br. 5):

[The Watanabe article] at p. 60, col. 1, lines 39-40 clearly states that a tin-oxygen double bond is converted to a tin-oxygen single bond, the oxygen becoming part of a hydroxyl group. The oxygen atom begins and ends this reaction bonded to the tin atom, without the addition of a whole water molecule. Any hydrogen added from a water molecule would require splitting an H-OH bond, contrary to the definition of hydration used in the rejection. Watanabe is not using the term "hydration" in the sense used in the rejection.

The Examiner has not established that the Watanabe article is using the term "hydration" according to the dictionary definition of that term relied upon by the Examiner. Watanabe uses the term "hydration" to refer to a hydrolysis (i.e., "a superficial hydration, i.e., the formation of an -Sn-OH surface by hydrolysis of -Sn=O bonds" (p. 60, fourth full paragraph)). Hydrolysis is "[a] decomposition reaction caused by water, $\text{AB} + \text{H}_2\text{O} = \text{AOH} + \text{HB}$ ".⁴ The Watanabe article's "hydration" appears to be a hydrolysis in accord with that definition (i.e., $\text{SnO} + \text{H}_2\text{O} = \text{SnOH} + \text{OH}$). As pointed out above, Hawley's definition of "hydration" states that the water's H-OH bond is not split. The Examiner has not established that the Watanabe article's conversion from -Sn=O to -SnOH can occur without water's H-OH bond being split. Thus, the Examiner's argument that "one of skill would have concluded the tin oxide subjected to hydration in Watanabe

³ *Supra* note 2.

⁴ *Hackh's Chemical Dictionary* 334 (G. & C. Merriam 1973).

could have been written as $\text{SnO}_x \cdot y\text{H}_2\text{O}$ because by definition the hydration of tin oxide results in a hydrate compound” (Ans. 8) is not persuasive.

The Declaration under 37 C.F.R. § 1.132 of Karen Swider-Lyons (filed Feb. 28, 2008) states that “[t]he structure of the claimed $\text{Pt-SnO}_2 \cdot y\text{H}_2\text{O}$ (or Pt-Sn hydroxide) is based on distorted and disordered $\text{Sn}_6\text{O}_4(\text{OH})_4$ hydroxide, known as tin oxide hydroxide” (p. 1). That statement, the Examiner argues, is an admission “that the claimed compound has a hydroxide (-OH) structure, but is still termed a ‘hydrate’ compound” (Ans. 8).

Swider-Lyons goes on to distinguish the Appellants’ composition over that of the Watanabe article (Decl. 2-3). The Examiner has not addressed Swider-Lyons’ distinction between the Appellants’ composition and that of the Watanabe article and explained why it is incorrect.

Rejections over Gardner

Findings of Fact

Gardner discloses Pt/SnO_2 catalysts supported on silica (abstract). Gardner discloses that heat pretreatment of the catalyst results an induction period in which the catalytic activity is temporarily decreased due, Gardner believes, to “surface dehydration caused by combination of surface hydroxyl groups and desorption of water” (p. 835, left column). Gardner teaches that there is no significant induction period when Pt/SnO_2 is humidified and that “[h]ydroscopic silica may improve the performance of Pt/SnO_2 surfaces by preventing extensive surface dehydration and consequent activity loss” (p. 835, right column).

The Examiner argues (Ans. 8-9):

Hawley's Chemical Dictionary discloses dehydration is the removal of one or more molecules of water from a chemical compound. Hawley's discloses the term dehydration is not applied to the loss of water by evaporation or sun-drying (pages 349-350). Therefore, one of skill would have concluded that the compound of Gardner was necessarily a hydrate. . . . Gardner teaches surface dehydration is caused by *desorption of water* (col. 1, second paragraph) which indicates a hydrate compound.

The Appellants argue (Br. 6):

Although dehydration of the material is disclosed [in Gardner], this does not imply that the material had been a hydrate before the dehydration. The water is made from hydroxyl groups, not hydrate groups. There is no disclosure that there was ever a hydrate group present.

Hawley's defines "dehydration" as "[r]emoval of 95% or more of the water from a material, usually a foodstuff, by exposure to high temperature by various means. . . . The term dehydration is not applied to loss of water by evaporation or sun-drying. See also drying" (pp. 349-50). The Examiner has not established that a material, before being dehydrated, is what Hawley's defines as a "hydrate", i.e., the product of the reaction of molecules of water with a substance in which the H-OH bond is not split (p. 611).⁵ Gardner believes that the water formed during the heat pretreatment of the Pt/SnO₂ comes from combination of surface hydroxyl groups (p. 835, left column). The Examiner has not established that water is produced from a Pt/SnO₂ hydrate.

⁵ The Examiner's reliance, with respect to the rejection over Gardner, upon the Declaration of Swider-Lyons (Ans. 9) is not persuasive for the reason given above regarding the rejection over the Watanabe article.

Conclusion of Law

The Appellants have indicted reversible error in the Examiner's determination that Watanabe and Gardner disclose a hydrate form of a platinum group metal-SnO_x composition.

Rejections under 35 U.S.C. § 103

The Examiner does not argue that the Watanabe article in combination with Watanabe '487 or Katayama, or Gardner in combination with Katayama, would have rendered a platinum group metal-tin oxide hydrate *prima facie* obvious to one of ordinary skill in the art (Ans. 5-7).

DECISION/ORDER

The rejections of claims 1, 2, 4, 10-12, 17 and 18 under 35 U.S.C. § 102(b) over the Watanabe article, claim 3 under 35 U.S.C. § 103 over the Watanabe article in view of Katayama, claims 1, 2, 4, 5, 12, 13, 15 and 17 under 35 U.S.C. § 102(b) over Gardner, claim 3 under 35 U.S.C. § 103 over Gardner in view of Katayama, and claims 1, 2 and 4-16 under 35 U.S.C. § 103 over Watanabe '487 in view of the Watanabe article are reversed.

It is ordered that the Examiner's decision is reversed.

REVERSED

tc
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